

REMARKS

The Claims

Claims 1-7 are presently pending in this application.

The Invention

An etching solution of the present invention includes hydrofluoric acid, nitric acid, and hexafluorosilicic acid, the concentration of the hexafluorosilicic acid being 10% to 40% by weight based on the weight of the etching solution. Etching solutions according to the present invention are useful for etching a silicon substrate and providing, e.g., a silicon wafer having improved flatness and gloss, at least in part because the claimed etching solution can be selected to have an optimal etching speed and etching rate, without runaway of the etching reaction.

The Rejection of the Claims

Claims 1-7 were rejected as unpatentable over Lee (US 6,284,712) in view of Uchida (US 5,307,296). Although the Examiner may have abandoned this ground of rejection (the Examiner states at Section 5 of the Office Action that "Applicant's arguments with respect to claims 1-7 have been considered but are moot in view of the new ground(s) of rejection"), Applicants traverse this rejection.

The teachings of the Lee and Uchida references have been previously described. It is Applicants' position that neither the Lee reference nor the Uchida reference, alone or in combination, render the claimed invention obvious, and the Examiner has therefore not established a *prima facie* case of obviousness.

Applicants have provided ample support for their position in previous communications. However, Applicants wish to respond to the Examiner's remarks concerning the Declaration Under 37 CFR 1.132 filed with the prior response ("the Declaration"). In the present Office Action, the Examiner states that the Declaration

is insufficient to overcome the rejection of claims 1-6 . . . over Lee et al. . . . in view of Uchida . . . as set forth in the last Office action because: the results shown . . . failed to adequately compare applicants' solutions . . . wherein only one

concentration of 42.7% by weight H_2SiF_6 that lies outside the range of 10% - 40% by weight H_2SiF_6 was only used to generalize etching solutions containing concentrations of hexafluorosilicic acid greater than and outside 40% are not optimally suited to etching silicon wafers. Applicants further failed to show what is expected if one uses for example, 45%, 50%, 60% . . . etc. by weight H_2SiF_6 ?

Office Action at Section 2. This rejection is traversed.

As previously described in the Declaration and in the accompanying remarks, solutions containing concentrations of hexafluorosilicic acid below 40% (see, e.g., Examples 1-13 of the present specification, and particularly Examples 8-10) were found to be better suited to etching a silicon substrate than was a solution having greater than 40% H_2SiF_6 by weight (the solutions of Examples 1-13, each having less than 40% hexafluorosilicic acid by weight, all have superior grades compared to the solution of the Declaration, which has greater than 40% hexafluorosilicic acid by weight). Applicants have therefore provided evidence for their contention that the claimed solutions (which have 10% to 40% by weight H_2SiF_6) are superior to solutions having greater than 40% by weight H_2SiF_6 . The Examiner's statement that Applicants have not shown "what is expected if one uses or example, 45%, 50%, 60% . . . etc." is inappropriate. In fact, Applicants contend that it is not possible to conduct an etching procedure using an etching solution containing hexafluorosilicic acid at a concentration greater than 45%.

Applicants have come forward with evidence to support their position; the Examiner cannot simply assert that Applicants have not supplied data for every possible solution. Applicants are not required to provide such data (see, e.g., MPEP 2144.08(II)(B)).

Reconsideration and withdrawal of the rejection is proper and such action is requested.

Claims 1-7 stand rejected under 35 U.S.C. 102(b) as being anticipated by Satoro *et al.*, (JP 11194120). This rejection is traversed.

The Examiner states that Satoro teaches "hexa FURORO silicic acid mixing concentration and the concentration of fluoric acid, and the concentration of an acetic acid corresponded to 39.3% of the weight, 7.5% of the weight, and 20.9% of the weight, respectively." Office Action at Section 4. Applicants do not agree.

Applicants respectfully contend that the reference does not anticipate the invention as defined by the pending claims. The Satoro reference, as understood by Applicants, is directed to methods and apparatus for *analyzing* mixed acid solutions, not to novel etching solutions

themselves (see, e.g., the Abstract). The Satoro reference describes analysis of a mixed acid solution which, after etching treatment of a silicon substrate, would include some hexafluorosilicic acid (see, e.g., Satoro at paragraphs 16-18). A mixed acid etching solution, after conclusion of an etching procedure, is generally referred to as a “waste solution.” Such a solution is not the same as an etching solution of the present invention.

Moreover, the Satoro reference does not disclose any specific solutions having the claimed amounts of hexafluorosilicic acid, nitric acid, and hydrofluoric acid. For example, the Satoro reference, at paragraph 46 (cited by the Examiner) refers to a solution which upon analysis was found to contain 39.3% nitric acid, 7.5% fluoric acid, and 20.9% acetic acid, by weight (see Satoro at paragraph 46, last sentence).

Similarly, at paragraph 48, Satoro discloses a solution which, after analysis, was found to contain 34.5% nitric acid, 7.5% fluoric acid, 20.9% acetic acid, and 4.6% hexafluorosilicic acid, by weight. In each case, the amount of hexafluorosilicic acid is less than 10%, which is outside the claimed range of 10 – 40% by weight recited in the solutions of the invention as presently claimed (15-40% according to claim 2).

Accordingly, Applicants respectfully submit that the Satoro reference does not teach or suggest a solution according to the present invention, and therefore cannot, and does not, anticipate the presently-pending claims.

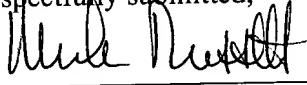
Reconsideration and withdrawal of the rejection is therefore appropriate and the same is requested.

CONCLUSION

It is respectfully submitted that the present application is in condition for allowance. An early consideration and notice of allowance are earnestly solicited.

In the event that an extension of time is required for this response to be considered timely submitted, the undersigned hereby conditionally petitions for any extension of time necessary. It is not believed any additional fees are required; however, if an additional fee is required, or if an overpayment is made, please charge/credit our deposit account 04-1105.

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